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MODIS Validation, Data Merger and Other Activities Accomplished by the SIMBIOS Project: 2002-2003

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Chapter 9

Current SeaDAS Support for MODIS Products

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Providing a variety of services to the user community has been a primary objective of the SeaWiFS Project since its inception at the NASA Goddard Space Flight Center. These free services include rapid and easy access to all SeaWiFS data products, comprehensive documentation of Project activities (i.e., the SeaWiFS Technical Memorandum Series), maintenance of an extensive website (http://seawifs.gsfc.nasa.gov/seawifs.html), and user-friendly data processing and display software i.e., the SeaWiFS Data Analysis System (SeaDAS; Baith et al., 2001). This philosophy and approach was a result of the research community's experience with the proof of concept Nimbus7/Coastal Zone Color Scanner (CZCS) mission. The CZCS data set was not exploited by the research community until several years after the launch in 1978 because the data was not available from an on-line data archive system until around 1990 and processing and display software was not generally available. Processing software for CZCS data was developed by individual researchers. The first PC version of one such package, SEAPAK (McClain et al., 1989), was distributed to the research community in 1989 and UNIX versions were subsequently released. SEAPAK provided the foundations for the SeaDAS development effort.

SeaDAS is a comprehensive image analysis software package for the processing, display, analysis, and quality control of ocean color data from multiple satellite sensors (SeaWiFS, CZCS, OCTS, MOS and OSMI) and is designed to serve a wide range of users, including scientists, SeaWiFS ground stations, and operational or commercial users. SeaDAS is designed to accurately replicate the operational data products, e.g., geophysical fields and data formats, generated by the SeaWiFS Project by using the default input values, but to also allow processing flexibility in the algorithms applied, the map projections used, and other aspects of processing and analyses that allow users to customize their data products.

Flexibility is enhanced by providing executable programs for those who only need the basic capabilities as well as source code for those who wish to modify the code to insert alternative algorithms. The SeaDAS development group is co-located with the SeaWiFS Project to help ensure close coordination with the SeaWiFS Project's development activities. The SeaDAS software is freely available for download from the SeaDAS website(http://seadas.gsfc.nasa.gov). Since SeaDAS development began in 1993, versions of SeaDAS have been released periodically even before the launch of SeaWiFS in order to prepare the community for SeaWiFS data. Version 4.4, the most current version, was released in March 2003. During its development SeaDAS has been expanded and generalized to provide processing for four additional satellite sensors: the Coastal Zone Color Scanner (CZCS), the Ocean Color Temperature Sensor (OCTS), the Ocean Scanning Multispectral Imager (OSMI), and the Modular Optoelectronic Scanner(MOS), as well as display and analysis support for the Moderate Resolution Imaging Spectroradiometer(MODIS) ocean data products and Advanced Very High Resolution Radar sea surface temperature (AVHRR SST) data. The support of international ocean color data sets is possible because of the Sensor Intercomparison and Merger for Biological and Interdisciplinary Oceanic Studies (SIMBIOS) Project (McClain and Fargion, 1999), also co-located with the SeaWiFS Project, which provides the processing code.

The Interactive Data Language (IDL) software product from Research Systems, Inc. is an integral part of SeaDAS. It is a high level interpretive programming language that is portable and can be used to develop GUI's, scientific graphics or any standard analysis application quickly and with a small amount of maintainable code and development time, relative to that required by low level programming languages such as C. Users do not need to know the IDL programming language in order to run SeaDAS. However, users who do know IDL can use their own IDL programs within the SeaDAS batch scripting environment.

The SeaDAS software package containsboth processing programs as well as a full suite of interactive display and basic analysis tools. SeaDAS is not designed to provide an extensive data analysis capability because these applications can be easily developed using IDL. Instead, the SeaDAS effort focuses primarily on satellite data processing and display. The majority of the underlying processing programs are C and/or FORTRAN programs developed by the SeaWiFS and SIMBIOS Projects and are the same programs as used in the operational processing of the SeaWiFS data. As a convenience to the user, SeaDAS provides GUI's from which to run these processing programs interactively as well as command mode capability and detailed documentation. The SeaDAS tool kit includes many navigation, display, analysis, and output functions. Navigation functions include data registration, map projections, overlaying of coastlines, plotting of *in situ* data, and latitude/longitude point location. General display functions include data scaling, color bar definition, annotation, zooming, roaming, and color palette manipulation. General analysis functions include bathymetry generation, simple arithmetic functions, contour plots, profile plots, scatter plots, and histograms. Output functions allow outputting either data or latitude/longitude values (ASCII, HDF, and binary flat file formats) or displayed images (PNG and Postscript formats).